Applicant : Stefan R. Kirsch et al.
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Attorney's Docket No.: 07508-046002

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A system for determining the position, orientation and system gain factor of a probe comprising:

a plurality of magnetic field sources;

at least one magnetic field sensor, wherein a combination of a magnetic field sensor and a magnetic field source generates a unique measured magnetic field value;

a probe whose gain, position, and orientation affects said unique measured magnetic field values; and

a processor, configured to receive and iteratively process said unique measured magnetic field values, for determining a system gain factor indicative of the gain of said probe and a plurality of location factors indicative of the position and orientation of said probe, wherein said iterative process is configured to determine a function of the differences between said measured magnetic field values and a plurality of predicted magnetic field values.

Please add the following claims:

2. (New) The system for determining the position, orientation and system gain factor of claim 1 wherein the number of unique measured magnetic field values generated is at least equal to the sum of the number of gain and location factors calculated.

3. (New) The system for determining the position, orientation and system gain factor of claim 2 wherein said processor includes a calculated location process for calculating said predicted magnetic field values, wherein said calculated location process guesses an initial

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gain, position, and orientation for said probe, and calculates said predicted magnetic field values based on a physical model and said initial gain, position, and orientation.

4. (New)   The system for determining the position, orientation and system gain factor of claim 3 wherein said initial position and orientation is a predetermined fixed point.

5. (New)   The system for determining the position, orientation and system gain factor of claim 3 wherein said initial position and orientation is a randomly selected fixed point.

6. (New)   The system for determining the position, orientation and system gain factor of claim 3 wherein said processor includes an optimization function for determining an extremum indicative of said differences between said measured magnetic field values and said predicted magnetic field values.

7. (New)   The system for determining the position, orientation and system gain factor of claim 6 wherein said optimization function is a least squares sum function.

8. (New)   The system for determining the position, orientation and system gain factor of claim 6 wherein said processor includes a repositioning process for adjusting said initial gain, position, and orientation of said probe in response to said extremum being in a predefined range of unacceptable values, which is indicative of an unacceptable level of difference between said measured magnetic field values and said plurality of predicted magnetic field values.

9. (New)   The system for determining the position, orientation and system gain factor of claim 1 wherein said location factors include spatial coordinates.

10. (New)   The system for determining the position, orientation and system gain factor of claim 1 wherein said location factors include spherical coordinates.

11. (New)   The system for determining the position, orientation and system gain
factor of claim 1 wherein said location factors include rotational coordinates.

12. (New)   A system for determining the position, orientation and system gain factor
of a probe comprising:

one of a plurality of magnetic field sensors and a plurality of magnetic field sources;

at least one of the other of the magnetic field sensors and magnetic field sources, wherein
a combination of a magnetic field sensor and a magnetic field source generates a unique
measured magnetic field value,

a probe whose gain, position, and orientation affects said unique measured magnetic field
values; and

a processor, configured to receive and iteratively process said unique measured magnetic
field values, for determining a system gain factor indicative of the gain of said probe and a
plurality of location factors indicative of the position and orientation of said probe;

wherein said iterative process is configured to determine a function of the differences
between said measured magnetic field values and a plurality of predicted magnetic field values.

13. (New)   The system for determining the position, orientation and system gain
factor of claim 12 wherein the number of unique measured magnetic field values generated is at
least equal to the sum of the number of gain and location factors calculated.

14. (New)   The system for determining the position, orientation and system gain
factor of claim 13 wherein said processor includes a calculated location process for calculating
said predicted magnetic field values, wherein said calculated location process guesses an initial
gain, position, and orientation for said probe, and calculates said predicted magnetic field values
based on a physical model and said initial gain, position, and orientation.

15. (New)   The system for determining the position, orientation and system gain factor of claim 14 wherein said initial position and orientation is a predetermined fixed point.

16. (New)   The system for determining the position, orientation and system gain factor of claim 14 wherein said initial position and orientation is a randomly selected fixed point.

17. (New)   The system for determining the position, orientation and system gain factor of claim 14 wherein said processor includes an optimization function for determining an extremum indicative of said differences between said measured magnetic field values and said predicted magnetic field values.

18. (New)   The system for determining the position, orientation and system gain factor of claim 17 wherein said optimization function is a least squares sum function.

19. (New)   The system for determining the position, orientation and system gain factor of claim 17 wherein said processor includes a repositioning process for adjusting said initial gain, position, and orientation of said probe in response to said extremum being in a predefined range of unacceptable values, which is indicative of an unacceptable level of difference between said measured magnetic field values and said plurality of predicted magnetic field values.

20. (New)   The system for determining the position, orientation and system gain factor of claim 12 wherein said location factors include spatial coordinates.

21. (New)   The system for determining the position, orientation and system gain factor of claim 12 wherein said location factors include spherical coordinates.

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22. (New)   The system for determining the position, orientation and system gain factor of claim 12 wherein said location factors include rotational coordinates.